REMARKS

Claims 1, 4-18, 33-35 and 37-55 are pending in this application, of which claims 7-14, 33, 43-50 and 55 have been withdrawn pursuant to a Restriction Requirement and an Election of Species Requirement, but should be rejoined when base claims 1 and 37 are allowed. By this Amendment, independent claim 1 is amended to more clearly define the claimed features. Support for the amendments can be found, for example, at paragraph [0061] of the specification as filed. No new matter is added.

I. The Claims Are Patentable Over The Applied References

The Office Action (1) rejects claims 1, 4, 6, 15-18, 37-40, 42 and 51-54 under 35 U.S.C. §103(a) over U.S. Patent Publication No. 2001/0053344 to Harutyunyan et al. (Harutyunyan) in view of Japanese Patent Publication No. 2003-313017 to Sugimoto et al. (Sugimoto); (2) rejects claims 1, 4-5, 37 and 40-41 under 35 U.S.C. §103(a) over U.S. Patent No. 5,702,532 to Wen et al. (Wen) in view of Sugimoto; and (3) rejects claims 1-4, 6, 15-18, 34-35, 37-40, 42 and 51-54 under 35 U.S.C. §103(a) over U.S. Patent Publication No. 2003/0147801 to Someya et al. (Someya) in view of Sugimoto. Applicants respectfully traverse the rejections.

Rejection Based On Harutyunyan

Regarding independent claims 1 and 37, the applied references fail to disclose (1) "a synthesizing portion that is placed in the reaction tube downstream, in the direction of the gas flow, of the gas decomposer" (claim 1); (2) "a synthesizing portion that is ... continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer" (claims 1 and 37); (3) "the gas decomposer is a molecular sieve" (claim 1); (4) "the gas decomposer is a zeolite-based material ..." (claim 37); and (5) "the gas decomposer ... has a pore diameter of 0.3 to 100 nm" (claim 37).

Harutyunyan discloses an apparatus 10 for producing elongated carbonaceous articles that includes chamber 11 having heating element 12, inlet port 18, exit port 20, a magnetic field generating device 40, and a catalyst bed 26 that has substrate 30 and catalyst 34. In operation, a carbon precursor from carbon-containing precursor source 16 enters the inlet port 18 in gaseous form (Fig. 1; paragraph [0031]) to form carbonaceous articles on substrate 30. The magnetic field generating device 40 produces a magnetic field that serves to prevent the catalyst from becoming an impurity in the carbonaceous articles. Substrate 30 can be a porous ceramic (paragraph [0032]). The Office Action cites to substrate 30 as allegedly corresponding to the claimed gas decomposer and cites to catalyst 34 as allegedly corresponding to the claimed synthesizing portion.

The Office Action acknowledges that Harutyunyan does not disclose (A) that the gas decomposer is a molecular sieve; and (B) that the gas decomposer is made of zeolite, but cites to Sugimoto as curing the deficiency of feature (B).

Sugimoto discloses a method of producing carbon nanotubes that produces larger quantities more efficiently as compared with the arc discharge method or laser irradiation method (Abstract). Sugimoto discloses use of zeolite as part of the catalyst (see Example 1, paragraphs [0009]-[0010]). The Office Action alleges it would have been obvious to modify Harutyunyan by Sugimoto to provide "a uniform pore size to more uniformly distribute and decompose the raw material gas".

The Office Action alleges that optimization of pore size was within the skill of one of ordinary skill in the art at the time of the invention citing *Gardner v. Tec Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984).

Regarding features (1) and (2) quoted above, Harutyunyan fails to disclose the claimed synthesizing portion because, in Harutyunyan, the carbonaceous articles are grown at the sites of catalyst 34 on substrate 30. Under the Office Action's interpretation of

Harutyunyan, the carbonaceous articles are thus grown on the gas decomposer, and therefore there is no element corresponding to the claimed synthesizing portion "that is placed in the reaction tube downstream, in the direction of the gas flow, of the gas decomposer" (emphasis added, feature feature (1) quoted above) or that is "continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer" (emphasis added, feature (2) quoted above). Sugimoto, cited for allegedly disclosing the use of zeolite, does not cure this deficiency.

Regarding features (3) and (4) quoted above, (a) it would not have been obvious to modify Harutyunyan in view of Sugimoto; and (b) even if the proposed combination is made, the proposed combination does not disclose all the features of the claims. First, Harutyunyan discloses a method that produces carbonaceous articles by catalytic decomposition in a high yield and in an efficient manner (paragraph [0009]). Second, Sugimoto's method produces larger quantities at a greater efficiency as compared with the arc discharge and laser irradiation methods. Third, both Harutyunyan and Sugimoto fail to disclose that the apparatus of Sugimoto provides "a uniform pore size to more uniformly distribute and decompose the raw material gas" better than the apparatus of Harutyunyan. Because (i) Harutyunyan discloses a method that produces a high yield at high efficiency, (ii) Harutyunyan does not use an arc discharge or laser irradiation method that allegedly would be "improved" by Sugimoto, and (iii) the motivation alleged by the Office Action is not supported by the references taken as a whole, there would have been no reason to modify Harutyunyan in view of Sugimoto. However, even if the proposed combination is made, all the claimed features are not disclosed because Sugimoto discloses that the zeolite is used in the catalyst, not in a gas decomposer. Thus, the proposed combination would lack the claimed gas decomposer.

Regarding feature (5) quoted above, the Office Action acknowledges that the applied

references fail to disclose the claimed pore sizes, but alleges that the claimed pore diameters would have been obvious, citing *Gardner v. Tec Systems, Inc.*, 725 F.2d 1338 (Fed. Cir. 1984). In *Gardner*, the Federal Circuit stated "If we are to agree with the trial court, we must have from it a finding supported by the record that TEC proved by clear and convincing evidence that a Gardner air bar coming within the claims of the '447 patent is not in any significant respect different from similar devices available in the prior art because structural differences over the prior art do not necessarily result in differences in performance over the prior art" (emphasis added, *Gardner* at 1345-1346). The Federal Circuit further stated "Whether meeting the dimensional limitations of claim 1 has no effect on air bar performance is, of course, a fact which TEC had the burden of proving" (emphasis added, *Gardner* at 1345). The Office Action has stated no basis for alleging that the claimed pore diameters have no effect on the gas decomposer performance relative to the applied references. Thus, the Office Action has failed to establish a case of a *prima facie* obviousness under *Gardner*.

For the foregoing reasons, Applicants request withdrawal of the rejection over Harutyunyan as primary reference.

Rejection Based On Wen

Regarding independent claims 1 and 37, applied references fail to disclose (1) "a gas decomposer that is placed in the reaction tube to decompose the carbon-containing raw material upon contact with the gas flow" (claims 1 and 37); (2) "a synthesizing portion that is placed in the reaction tube downstream, in the direction of the gas flow, of the gas decomposer" (claim 1); (3) "the gas decomposer is a molecular sieve" (claim 1); (4) "the gas decomposer is a zeolite-based material ..." (claim 37); and (5) "the gas decomposer ... has a pore diameter of 0.3 to 100 nm" (claim 37).

Wen discloses a metal organic-chemical vapor-phase deposition (MOCVD) reactor chamber 20 having a rotatable susceptor 21 having wafers/substrates 23 and a heat source 25

(Fig. 1). In operation, two different precursors, precursors 1 and 2, e.g., indium (Group III) and antimony (Group V), are input through manifolds 17 and 16, respectively (Fig. 1; col. 4, lines 26-40) to produce an indium antimonide epitaxial layer on the wafers 23. Wen does not disclose that wafer 23 is suitable for growing carbon nanotubes. The Office Action cites to precracking zone 28 as allegedly corresponding to the claimed gas decomposer, but the precracking zone 28 is a space, not a structure (Fig. 4). The Office Action cites to wafer 23 as allegedly corresponding to the claimed synthesizing portion.

The Office Action acknowledges that Wen does not disclose (A) that the gas decomposer is a molecular sieve; and (B) that the gas decomposer is made of zeolite, but (i) cites to Sugimoto as curing the deficiency of feature (B). The Office Action further alleges that optimization of pore size was within the skill of one of ordinary skill, similar to what the Office Action alleges in relation to the rejection over Harutyunyan. The Office Action alleges that it would have been obvious to modify Wen in view of Sugimoto to "increase the area of the gas decomposer to improve the efficiency of the gas decomposer".

Regarding features (1) and (2) quoted above, the Office Action cites the Wen precracking zone 28 as corresponding to the recited gas decomposer. Because the precracking zone 28 is a space or void, it does not correspond to the recited feature (1) structure of a "gas decomposer that is placed in the reaction tube to decompose the carbon-containing raw material upon contact with the gas flow." Further, regarding feature (2) quoted above, Applicants note that the structure that produces the precracking in Wen includes the heat source 25 coupled with the rotatable susceptor 21. However, wafer 23, alleged to correspond to the recited synthesizing portion, is not downstream of the heat source 25 and susceptor 21 as claimed. Sugimoto, cited for allegedly disclosing the use of zeolite, does not cure these deficiencies.

Regarding features (3) and (4) quoted above, (a) it would not have been obvious to modify Wen in view of Sugimoto; and (b) even if the proposed combination is made, the proposed combination does not disclose all the features of the claims. First, the Office Action's motivation to modify Wen by Sugimoto, to "increase the area of the gas decomposer to improve the efficiency of the gas decomposer", does not make sense. As discussed above, the Office Action alleges that Wen's precraking zone 28 corresponds to the claimed gas decomposer. Replacing precraking zone 28 by Sugimoto's solid catalyst (paragraphs [0005]-[0006]) would block the precursors of Wen from reaching wafer 23, rendering Wen's apparatus unsuitable for its intended purpose in violation of MPEP §2143.01(V). Second, Sugimoto's method produces larger quantities at a greater efficiency as compared with the arc discharge and laser irradiation methods (Abstract). Because Wen does not disclose use of either of these methods, the modification of Wen in view of Sugimoto would not have been obvious. Third, both Wen and Sugimoto fail to disclose that the apparatus of Sugimoto operates to "increase the area of the gas decomposer to improve the efficiency of the gas decomposer" as compared to the apparatus of Wen.

Because the motivation alleged by the Office Action is not supported by the references taken as a whole, there would have been no reason to modify Wen in view of Sugimoto. Even if the proposed combination is made, however, all the claimed features are not disclosed because Sugimoto discloses that the zeolite is used in the catalyst, not in a gas decomposer. Thus, the proposed combination would lack the claimed gas decomposer.

Regarding feature (5) quoted above, it would not have been obvious to modify Wen or Wen in view of Sugimoto to have the claimed pore sizes for reasons similar to the reasons discussed in relation to the rejection over Harutyunyan as primary reference.

For the foregoing reasons, Applicants request withdrawal of the rejection over Wen as primary reference.

Rejection Based On Someya

Regarding independent claims 1, 34 and 37, the applied references fail to disclose (1) "a synthesizing portion that is placed in the reaction tube downstream, in the direction of the gas flow, of the gas decomposer" (claim 1); (2) "a synthesizing portion that is ... continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer" (claims 1 and 37); (3) "the gas decomposer is a molecular sieve" (claim 1) and "a gas decomposer . . . comprising a porous material that is a molecular sieve" (claim 34); (4) "the gas decomposer is a zeolite-based material ..." (claim 37); and (5) "the gas decomposer ... has a pore diameter of 0.3 to 100 nm" (claim 37).

Someya discloses a process for producing aligned carbon nanotube films (Abstract). The process uses a porous ceramic substrate (paragraphs [0016]-[0018]) and includes the steps of: coating the substrate by a non-catalytic element in a first step (paragraphs [0019]-[0020]); coating the substrate with a catalytic metallic element in a second step (paragraph [0021]); and depositing a carbon compound to form the carbon nanotube film in a third step (paragraph [0032]). The carbon compound used is any type able to form carbon nanotubes in the presence of a suitable catalyst (paragraph [0032]). Pyrolysis is the most common way for decomposing the carbon compound (paragraph [0032]). The Office Action cites to element 2 of Fig. 4 as allegedly corresponding to the claimed gas decomposer. However, element 2 is masking tape 2 that is used to mask a substrate 1 made of silica-alumina before aluminum deposition (Fig. 4; paragraph [0047]). The Office Action does not cite to any element as allegedly corresponding to the claimed synthesizing portion. Applicants understand that the silica-alumina sheet (Examples) allegedly corresponds to the claimed synthesizing portion.

The Office Action acknowledges that Someya does not disclose (A) that the gas decomposer is a molecular sieve; and (B) that the gas decomposer is made of zeolite, but cites to Sugimoto as curing the deficiency of feature (B). The Office Action further alleges that

optimization of pore size was within the skill of one of ordinary skill, similar to what the Office Action alleges in relation to the rejection over Harutyunyan. The Office Action alleges that it would have been obvious to modify Someya in view of Sugimoto to provide "a uniform pore size to more uniformly distribute and decompose the raw material gas".

Regarding feature (1) quoted above, because Someya does not disclose a gas decomposer (masking tape 2, having no effect on a gas, does not correspond to the claimed gas decomposer), Someya fails to disclose "a synthesizing portion that is placed in the reaction tube downstream, in the direction of the gas flow, of the gas decomposer" as recited in claim 1. Sugimoto, cited for allegedly disclosing the use of zeolite, does not cure this deficiency.

Regarding feature (2) quoted above, Someya fails to disclose or suggest the synthesizing portion because Someya discloses that the carbon nanotubes are grown on the substrate that is coated by a catalyst. Thus, there is no element corresponding to the claimed synthesizing portion that is "continuously supplied with the decomposed carbon-containing raw material, which has been carried on the gas flow to an outside of the gas decomposer". Sugimoto, cited for allegedly disclosing the use of zeolite, does not cure this deficiency.

Regarding features (3) and (4) quoted above, (a) it would not have been obvious to modify Someya in view of Sugimoto; and (b) even if the proposed combination is made, the proposed combination does not disclose all the features of the claims. First, Someya discloses that the carbon compound is decomposed by pyrolysis. Thus, no gas decomposer as disclosed by Sugimoto is required. Second, neither Someya nor Sugimoto disclose that the apparatus of Someya has a problem with insufficiently uniform pore size or with insufficiently uniform distribution of gas. Third, Sugimoto's method produces larger quantities at a greater efficiency as compared with the arc discharge and laser irradiation methods (Abstract). Fourth, both Someya and Sugimoto fail to disclose that the apparatus of

Sugimoto provides "a uniform pore size to more uniformly distribute and decompose the raw material gas" than the apparatus of Someya. Because (i) Someya would not benefit by the addition of the gas decomposer of Sugimoto, (ii) Someya does not have a problem with the uniformity of the distribution of pore size (as no solid gas decomposer is used) or uniformity of gas distribution, (iii) Someya does not use an arc discharge or laser irradiation method, and (iv) the motivation alleged by the Office Action is not supported by the references taken as a whole, there would have been no reason to modify Someya in view of Sugimoto. Even if the proposed combination is made, however, all the claimed features are not disclosed because Sugimoto discloses that the zeolite is used in the catalyst, not in a gas decomposer. Thus, the proposed combination would lack the claimed gas decomposer.

Regarding feature (5) quoted above, it would not have been obvious to modify Someya or Someya in view of Sugimoto to have the claimed pore sizes for reasons similar to the reasons discussed in relation to the rejection over Harutyunyan as primary reference.

For the foregoing reasons, Applicants request withdrawal of the rejection over Someya as primary reference.

II. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

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Attachment:
Request for Continued Examination

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